

What is claimed:

1 1. A method for detecting leakage from a disk drive enclosure, comprising:
2 providing a disk drive enclosure having a lubricating material and a tag material
3 therein, wherein at least a portion of the lubricating material and the tag material are in the
4 vapor phase; and
5 measuring a concentration of the tag material in the vapor phase.

1 2. A method as in claim 1, wherein the tag material comprises a halogenated
2 material.

1 3. A method as in claim 2, wherein the halogenated material comprises a
2 halogenated sulfur material.

1 4. A method as in claim 1, wherein the tag material comprises at least one
2 material selected from the group consisting of SF₆ and S₂F₁₀.

1 5. A method as in claim 1, wherein the tag material comprises SF₆ and S₂F₁₀.

1 6. A method as in claim 4, wherein the lubricating material comprises a
2 perfluoropolyether.

1 7. A method as in claim 1, further comprising determining a leak rate of the
2 lubricating material from the vapor phase concentration of the tag material.

1 8. A method as in claim 1, further comprising determining an amount of
2 lubricating material remaining in the disk drive enclosure using the concentration of the tag
3 material.

1 9. A method as in claim 1, wherein the measuring a vapor phase concentration
2 of the tag material is conducted inside of the disk drive enclosure.

1 10. A method as in claim 9, wherein the measuring is carried out over a period of
2 time at a predetermined interval.

1 11. A method as in claim 1, further comprising:
2 measuring a concentration of the tag material outside of the enclosure over a time
3 interval and determining a leak rate of the lubricating material from the disk drive enclosure.

1 12. A method as in claim 11, further comprising determining a quantity of the
2 lubricating material remaining in the disk drive enclosure.

1 13. A method as in claim 1, further comprising measuring a concentration of the
2 tag material outside of the disk drive enclosure over a period of time and determining a leak
3 rate of the lubricating material from the disk drive enclosure.

1 14. A method as in claim 13, further comprising determining a quantity of the
2 lubricating material remaining in the disk drive enclosure after the period of time.

1 15. A method as in claim 1, wherein the tag material has a volatility that is
2 greater than that of the lubricating material.
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1 16. A disk drive system comprising:
2 at least one disk adapted to store data;
3 at least one transducer adapted to read and write data to and from the disk; and
4 a lubricant composition comprising a lubricant component adapted to lubricate the
5 disk surface and a tag component, wherein the tag component has a volatility that enables
6 the tag to be detected in the vapor phase.

1 17. A disk drive system as in claim 16, wherein the tag component comprises a
2 halogenated sulfur material.

1 18. A disk drive system as in claim 16, wherein the tag component comprises at
2 least one material selected from the group consisting of SF₆ and S₂F₁₀.

1 19. A disk drive system as in claim 16, wherein the tag component comprises SF₆
2 and S₂F₁₀.

1 20. A disk drive system as in claim 18, wherein the lubricating component
2 comprises a perfluoropolyether.

1 21. A disk drive system as in claim 16, wherein the tag component volatility is
2 greater than that of the lubricant.

1 22. A disk drive system comprising:
2 at least one disk adapted to store data;
3 at least one transducer adapted to read and write data to and from the disk;
4 a first source of a volatile lubricant; and
5 a second source of a tag component incorporated into a substantially non-volatile
6 material, wherein the tag component has a volatility that enables the tag component to be
7 detected in the vapor phase.

1 23. A disk drive system as in claim 22, wherein the volatile lubricant includes a
2 perfluoropolyether material and the tag component comprises a halogenated sulfur material
3 that is incorporated into a hydrocarbon oil.

1 24. A lubricant composition for disk drive systems comprising a
2 perfluoropolyether material and a halogenated sulfur material.

1 25. A lubricant composition for disk drive systems comprising a lubricant
2 material and a tag material, wherein the tag material can be detected in the vapor phase.

1 26. A lubricant composition as in claim 25, wherein the tag material comprises a
2 halogenated sulfur molecule.

1 27. A lubricant composition as in claim 25, wherein the tag material comprises at
2 least one material selected from the group consisting of SF₆ and S₂F₁₀.

1 28. A lubricant composition as in claim 27, wherein the lubricant material
2 comprises a perfluoropolyether.

1 29. A lubricant composition as in claim 27, wherein the lubricant material
2 comprises a material selected from the group consisting of alcohols, hydrocarbon esters,
3 stearic acid, palmitic acid, other carboxylic acids

1 30. A lubricant composition as in claim 27, wherein the lubricant material
2 comprises a material selected from the group consisting of a perfluoropolyether or a volatile
3 hydrocarbon compounds of the variety used in formulating greases.

1 31. A computer system comprising:
2 a disk drive including a disk drive enclosure;
3 a disk drive lubricant composition including a lubricant component and a tag
4 component; and
5 a sensor adapted to detect a quantity of the tag component in the vapor phase.

1 32. A computer system as in claim 31, wherein the sensor is positioned outside
2 the disk drive enclosure.

1 33. A computer system as in claim 31, wherein the sensor is positioned inside the
2 disk drive enclosure.

1 34. A computer as in claim 31, where the computer includes a computer program
2 that is capable of causing the computer system to measure the concentration of the tag
3 component in the vapor phase at a predetermined time interval.

1 35. A computer as in claim 31, wherein the computer includes a computer
2 program that is capable of causing the computer system to measure the concentration of the
3 tag component and determine at least one of a leak rate of the lubricant material from the
4 disk drive assembly and an amount of the lubricant material in the disk drive assembly.

1 36. A computer as in claim 31, wherein the tag component has a volatility that is
2 greater than that of the lubricant.

1 37. A computer as in claim 31, further comprising a lubricant component source
2 and a target component source, wherein the lubricant component source is separate from the
3 tag component source.

1 38. A computer as in claim 31, further comprising a source that contains both the
2 lubricant component and the tag component.